What is claimed is:

1. A method for quantum computing with a quantum system comprising a first energy level, a second energy level, and a third energy level, wherein said first energy level and said second energy level are capable of being degenerate with respect to each other, the method comprising:

applying to said quantum system a signal having an alternating amplitude at an associated frequency, wherein (i) the frequency of said signal correlates with an energy level separation between the first energy level and the third energy level or (ii) the frequency of said signal correlates with an energy level separation between the second energy level and the third energy level,

thereby inducing an oscillation in the state of said quantum system between said first energy level and said second energy level.

2. The method of claim 1, wherein said first energy level and said second energy level form basis states of a qubit.

3. The method of claim 1, wherein a rate that the oscillation is induced is a function of a maximum amplitude of the signal.

4. The method of claim 1, wherein the signal is detuned by an amount δ from a value of the associated frequency.

5. The method of claim 4, wherein the amount δ is between 2 and 300 percent of the value of the associated frequency.

6. The method of claim 4, wherein the amount δ is between -50 and 200 percent of the value of the associated frequency.

7. The method of claim 4, wherein the amount δ is between 1 MHz and 1 GHz.

8. The method of claim 1, wherein the signal is applied for a duration greater than 100 picoseconds and less than 10 microseconds.

9. A method for quantum computing with a quantum system having a first pair of degenerate energy levels and a second pair of energy levels, the method comprising:

applying to said quantum system a first signal having an alternating amplitude at an associated frequency for a first time period, wherein the frequency of said first signal correlates with the energy level separation between an energy level in the first pair of degenerate energy levels and an energy level in the second pair of degenerate energy levels;

allowing the system to evolve freely for a second time period; and

reapplying said first signal for a third time period.

10. The method of claim 9, wherein said third time period is the same as said first time period.

11. The method of claim 9, wherein the first time period is between 1 picosecond and 10 microseconds.

12. The method of claim 9, wherein the second time period permits a single qubit operation that induces an angle of rotation between 0 radians and 2π radians to a state of the quantum system.

13. The method of claim 9, wherein the second time period is the inverse of a tunneling frequency of the second pair of energy levels.

14. The method of claim 9, wherein there is natural quantum tunneling between a first energy level and a second energy level of the second pair of energy levels.

15. The method of claim 9, wherein the second pair of energy levels is degenerate.

16. The method of claim 9, wherein the third time period is greater than 1 picosecond and less than 10 microseconds.

17. A method for quantum computing with a quantum system comprising a first energy level, a second energy level and a third energy level, the method comprising inducing an oscillation in the state of said quantum system between said first energy level and second energy level by:

applying to said quantum system a first signal having an alternating amplitude at an associated first frequency for a first time period, wherein said first frequency of said first signal correlates with an energy level separation between the first energy level and the third energy level;

applying to said quantum system a second signal having an alternating amplitude at an associated second frequency for a second time period, wherein said second frequency of said second signal correlates with an energy level separation between the second energy level and the third energy level; and

reapplying said first signal to said quantum system for a third time period, wherein said first frequency of said first signal correlates with the energy level separation between the first energy level and the third energy level.

18. A method for performing a readout operation of a quantum system having a first energy level, a second energy level, and a third energy level, wherein said third energy level has a measurable escape path, the method comprising;

applying to said quantum system a signal having an alternating amplitude at an associated frequency, wherein said frequency of said signal correlates with the energy level separation between one of (i) said first energy level and said third energy level, and (ii) said second energy level and said third energy level; and

determining when the system has escaped said third energy level through said measurable escape path.

19. The method of claim 18, wherein the first energy level, and the second energy level differ in energy.

20. A qubit comprising a Josephson junction formed by an intersection of a first bank of unconventional superconducting material and a second bank of unconventional superconducting material, wherein said qubit is characterized by a first basis state and a second basis state and wherein said first basis state and said second basis state respectively correspond to a first degenerate ground state energy level and a second degenerate ground state energy level of the Josephson junction.

21. The qubit of claim 20, further comprising a current source attached to a first side or a second side of the Josephson junction, wherein the current source is configured to adjust a relative energy of said first degenerate ground state energy level and said second degenerate ground state energy level.

22. The qubit of claim 20, further comprising a voltmeter attached to a first side or a second side of the Josephson junction, wherein the voltmeter source is configured to measure a potential drop across the Josephson junction.

23. A qubit comprising a molecule having a first ground state and a second ground state, the first ground state and the second ground state each corresponding to an energy level in a double well energy potential, wherein the double well energy potential has an associated tunneling amplitude; wherein,

a Rabi oscillation between said first ground state and said second ground state is induced; and

the associated tunneling amplitude is less than the frequency of said Rabi oscillation.

24. The qubit of claim 23, wherein the associated tunneling amplitude is equal to or less than the arithmetic inverse of a decoherence time associated with the qubit.

25. The qubit of claim 23, wherein the molecule comprises a chemical group including one or more atoms, and two or more hydrogen atoms bound to the chemical group and wherein the associated tunneling amplitude of the molecule is less than the frequency of said Rabi oscillation.

26. The qubit of claim 23, wherein the molecule is asine (AsY_3), phosphine (PY_3), or NY_2CN, wherein each Y is the same or different and is independently selected from the group consisting of hydrogen, deuterium, and tritium.